N/C

(12) UK Patent Application (19) GB (11) 2 256 257 (13) A

(43) Date of A publication 02.12.1992

(21) Application No 9111739.0

(22) Date of filing 31.05.1991

(51) INT CL[5]
F16K 31/08 31/34

(52) UK CL (Edition K)
F2V VS42
G3P PEAX P1D P11 P24KX
U1S S1713

(56) Documents cited
GB 2217049 A GB 2210680 A GB 2149148 A
US 4632142 A US 4444217 A US 4399835 A
US 3527172 A

(58) Field of search
UK CL (Edition K) F2V VS42, G3P PEAX
INT CL[5] F16K
Online databases: WPI

(71) Applicant
Jasmart Design & Technology Limited

(Incorporated in the United Kingdom)

Court View, 55 Sylvan Way, West Wickham, Kent, BR4 9HA, United Kingdom

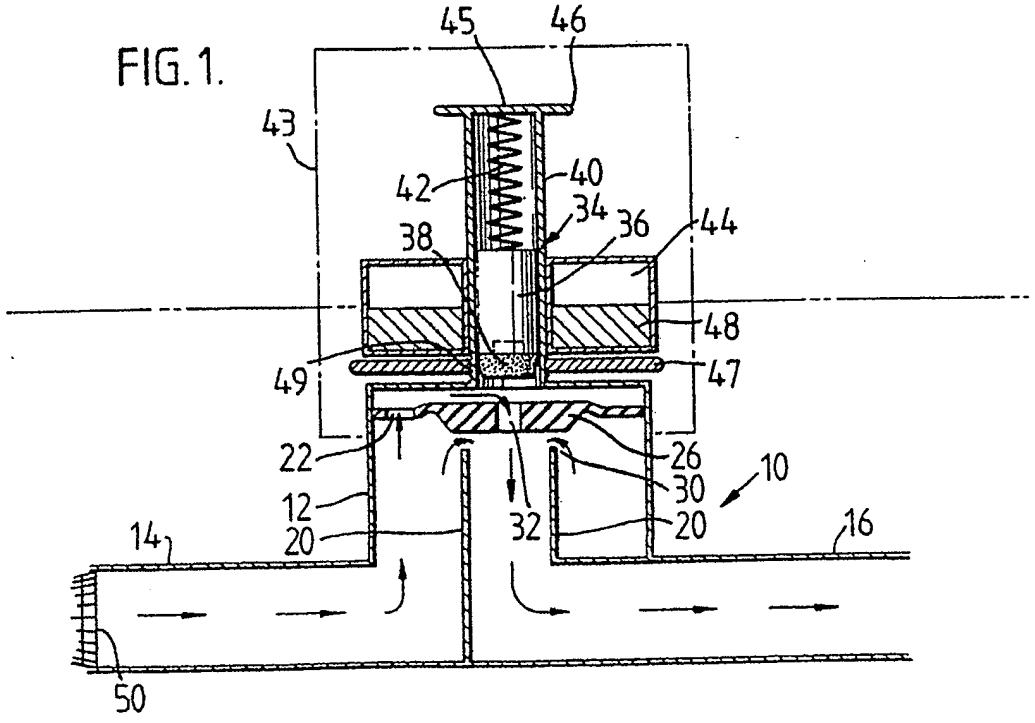
(72) Inventor
Martyn Neil Jones

(74) Agent and/or Address for Service
Raworth Moss & Cook
Raworth House, 36 Sydenham Road, Croydon, Surrey, CR0 2EF, United Kingdom

(54) **A liquid level control valve**

(57) In a liquid level control valve (10), particularly for use with cisterns, a valve closure member (34) has a ~~first magnetic~~ element (36) and a second magnetic element (48) is connected to a float (44), the magnetic elements cooperating to effect movement of the closure member away from its seating. The closure member (34) provides pilot control of a main diaphragm valve member (26) which controls the flow of liquid between an inlet (14) and an outlet (16). One version of the valve in a double form (Fig. 4, not shown) can be used to cause a pair of inlets to be closed off in the event of an overflow. The valve can close downwardly or upwardly.

FIG. 1.



GB 2 256 257 A

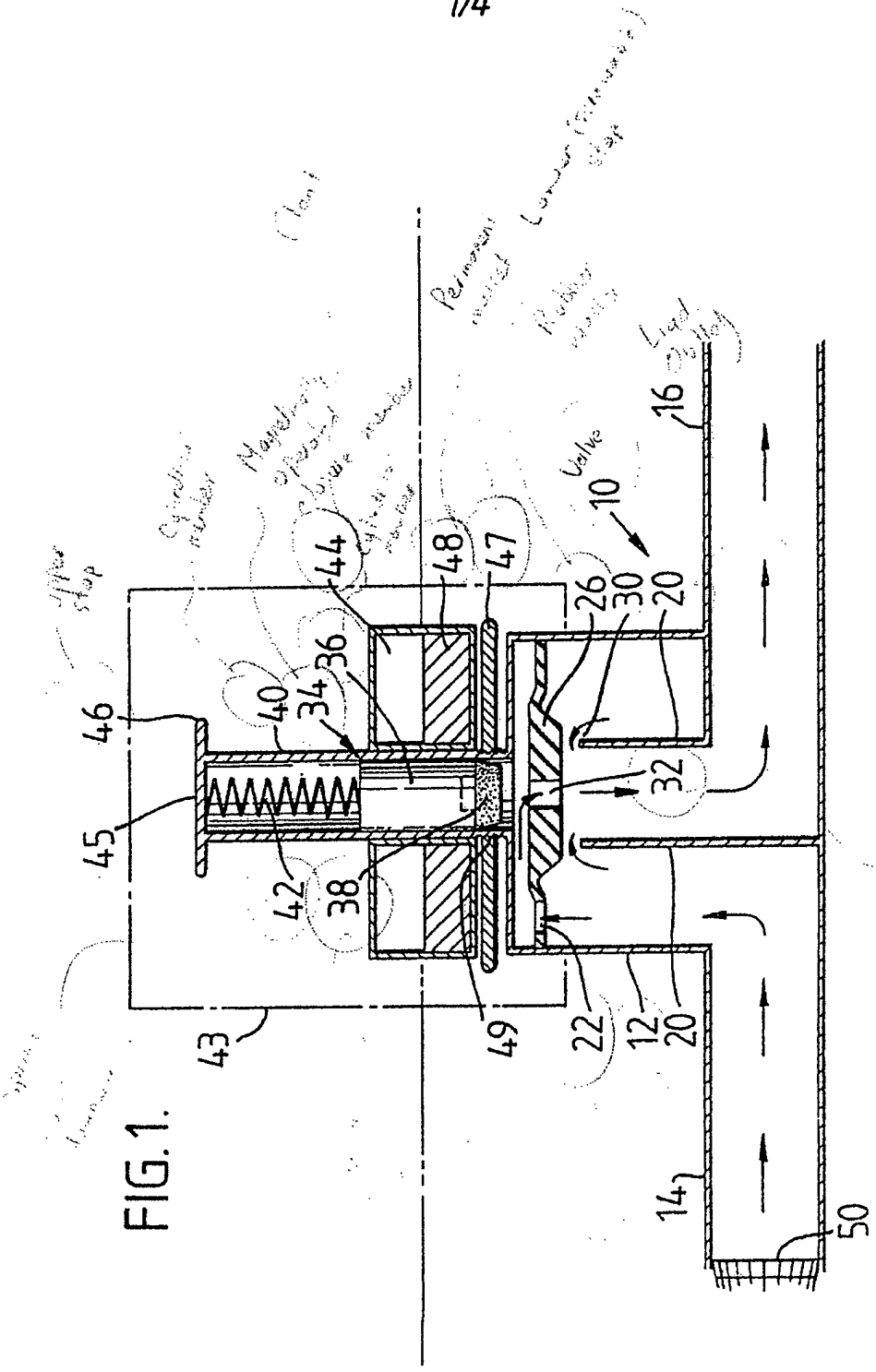


FIG. 1.

FIG. 2.

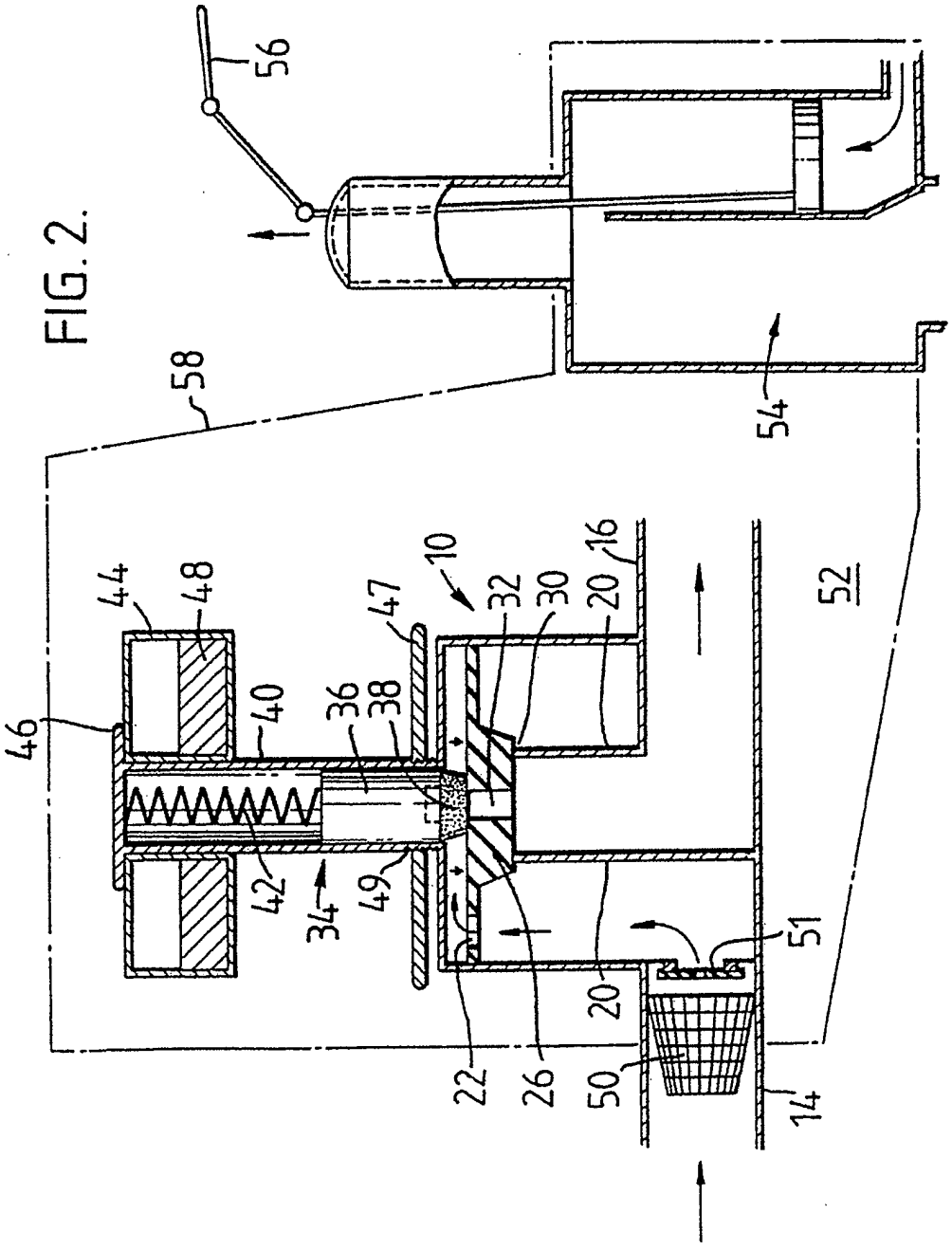

56
58
54
52
10
16
20
32
30
44
48
47
46
40
36
38
42
34
49
51
20
22
26
50
14

FIG. 3.

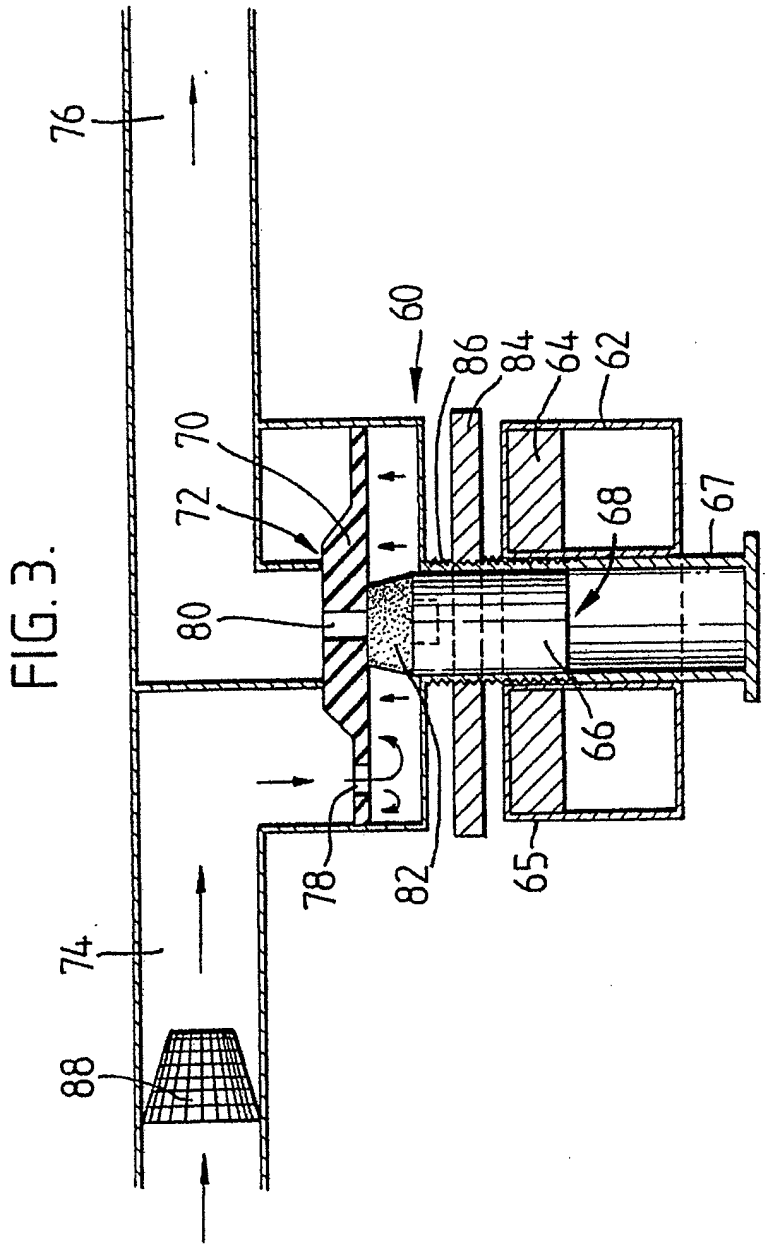
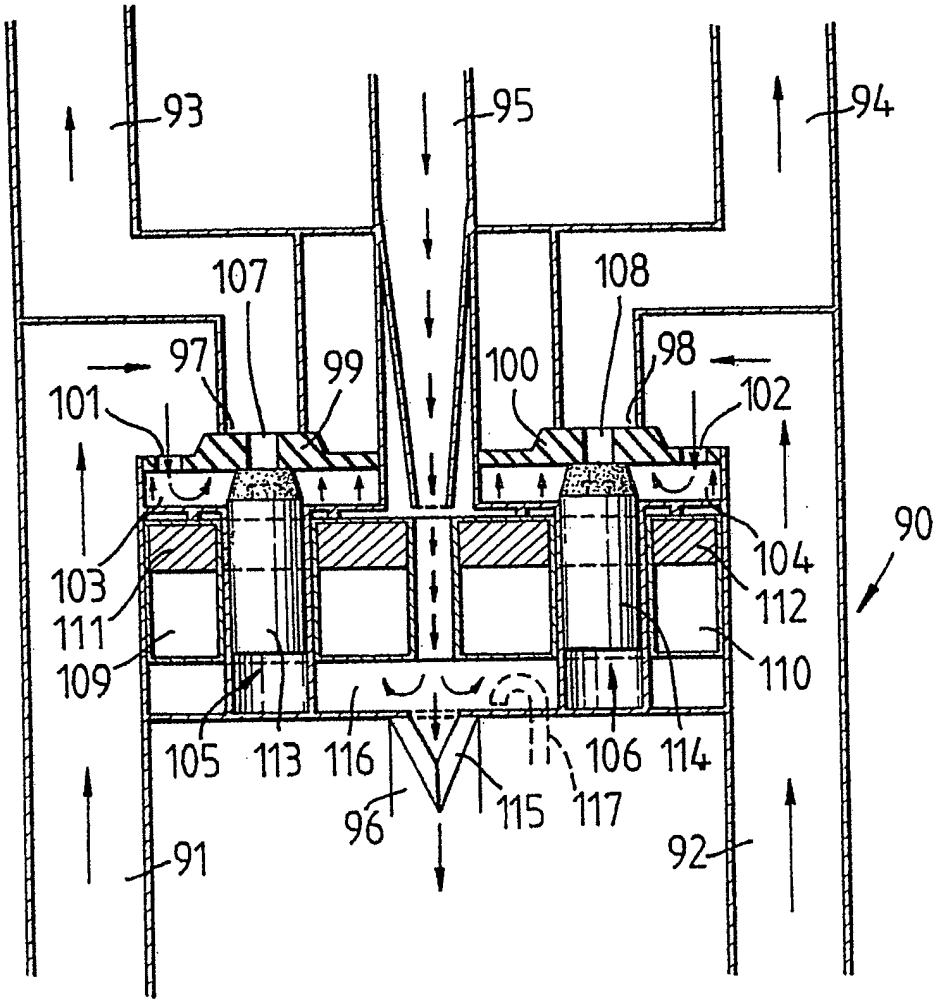


FIG. 4.


93
95
94
107
108
97
99
100
98
101
102
90
103
104
111
112
109
110
105
113
116
106
114
96
115
117
91
92

LIQUID LEVEL CONTROL VALVE

This invention relates to a liquid level control valve suitable for but not exclusively usable in cisterns.

In domestic cisterns such as are used for water closets or feeder tanks, ball cock valves are commonly used. These valves require sufficient room for the ball and ball arm. In cisterns where space is at a premium the ball may catch on a side of the cistern which prevents the valve closing at the correct setting as the cistern fills.

According to the present invention there is provided a liquid level control valve comprising a liquid inlet and a liquid outlet, a valve seating and valve closure member cooperating with the seating to control a flow of liquid between the inlet and outlet the valve closure member including a first magnetic element, and a float connected to a second magnetic element, the magnetic elements cooperating so that as the liquid level increases the second magnetic element draws the closure member from the seating. The closure member may be arranged to be drawn away from the seating until the float reaches a predetermined level where the buoyancy of the float overcomes the magnetic attraction between the elements enabling the closure member to return to close the valve.

Preferably, the first magnetic element is of a magnetic material such as soft iron and the second element is a permanent magnet. Preferably the closure member is resiliently biased towards the closed position.

The control valve of the invention requires only a small float and can be fitted into a cistern with only a small space. Since the float can be movable in a simple linear direction to and from the seating a small compact unit can be provided which does not foul the sides of the cistern. Furthermore the valve may also be used as an overflow cut-off valve as will be described. The closure member can be spring biased downwardly onto a valve disc or may act upwards without a bias towards the seating.

The invention will now be described by way of example with reference to the accompanying drawings, in which:

Fig. 1 is a cross-sectional view of one embodiment of a valve according to the invention in the valve open condition,

Fig. 2 is a cross-sectional view of the valve according to Fig. 1 in the valve closed condition as mounted in a cistern,

Fig. 3 is a cross-sectional view of a second embodiment of a valve according to the invention in a valve closed condition, and

Fig. 4 is a cross-sectional view of a third embodiment of a valve according to the invention.

Referring to Fig. 1 there is shown a valve 10 comprising a housing 12 having a liquid inlet 14 and liquid outlet 16. A barrier 20 being a first part of an outlet conduit across the flow path then routes the direction of flow upwardly through first orifices 22, and a central second orifice 32 arranged in a rubber washer 26. The flow also also passes under the washer over valve seating 30.

A magnetically-operated closure member 34 in the form of a cylindrical member 36 of magnetic material having a resilient sealing member 38 secured to the end thereof. The member 38 can be of rubber or resilient plastics material and the member 36 preferably has a non-corrosive coating. The member 34 can move up and down in a cylindrical member 40, being biased downwardly by a non-corrosive spring 42 which at one end abuts the member 36 and at the other end abuts closure 45 for the cylinder 40.

In the lowermost position of the member 36, the sealing member 38 seals the orifice 32 against liquid flow. Surrounding the cylindrical member 40 and in sliding engagement therewith is a float 44 which has an upper limiting position defined by an upper stop 46.

A permanent magnet 48 is fixedly secured in float 44 so as to move up and down with the float.

A lower stop 47 screwable for vertical adjustment on thread 49 ensures the float and magnet 48 drops.

A filter 50 and shock absorbing diaphragm valve 51 is included in the inlet 14 to remove any solid particles in the liquid which could block or otherwise interfere with the flow path through the valve orifices 22 and 32.

A perforated cover 43 may be provided to protect the float 44.

Referring now to Fig. 2 there is shown the valve 10 of Fig. 1 mounted in the cistern 52 of a typical water closet, having a syphonic valve 54 operated by handle 56. As shown the water level 58 is sufficient to

maintain the float 44 in its uppermost position as shown in Fig. 1. In this position the permanent magnet 48 has just released the valve closure member 34 so that it is biased to its lowermost position by spring 42 and the washer 26 closes seating 30 to prevent further flow of water into the cistern 52.

On operation of the handle 56 to actuate the syphonic valve 54 the contents of the cistern are discharged in the usual way and the level of the float 44 drops with the water level 58. The member 36 comes under the influence of the permanent magnet 48 and is attracted upwardly against the bias of the spring 42 to open the flow path through orifices 22, 32 and seating 30. Water thus flows into the cistern until the water level 58 again rises to a height at which the float 44 lifts the permanent magnet 48 to a position where the spring 42 again biases the member 36 and hence the sealing member 38 downwardly to close the orifice 32 and seating 30 and stop the flow of water into the cistern.

Thus there has been described a relatively simple and compact valve assembly which can be opened and closed by changes in the level of liquid which controls the position of the float 44.

In certain applications it is important to control the volume of liquid to be dispensed from a reservoir and in the case of a w.c. cistern the Water Authorities stipulate the maximum volume to be discharged each time the valve 54 is actuated.

In such applications, it is important to be able to adjust the valve 10 and one simple way of achieving this is shown at 47.

In Figure 3 a control valve 60 similar to valve 10 is shown but in this case float 62 carrying magnetic element 64 is mounted on the bottom of housing 65. Element 64 cooperates with element 66 forming a part of closure member 68 which acts on washer 70 to close outer seating 72 between liquid inlet 74 and liquid outlet 76. Orifices 78 and 80 in washer 70 enable the washer to be loaded by water pressure from inlet 74. Orifice 80 is closed off by tip 82 of closure member 68 in the same way as valve 10. No spring is needed to bias member 68 onto the washer. Closure member 68 is simply carried up and down by magnetic interaction of magnetic elements 66 and 64 carried by float 62 the upper limit of movement of which can be adjusted by a magnetic biasing plate 84 screwed on thread 86. A filter 88 is fitted in inlet 74 as in valve 10.

This leads to a third embodiment of the invention shown in Figure 4 in which a valve 90 using the same interactive magnetic principle as in valves 10 and 60 is used to close off hot and cold water inlets 91 and 92 connected to outlets 93 and 94 to a basin or bath (not shown). The basin or bath overflow is connected to valve overflow inlet 95 which in turn connects to valve overflow outlet 96. Between each inlet 91, 92 and outlet 93, 94 is a valve seating 97 and 98 respectively and a valve washer 99 and 100 respectively. A loading orifice 101 and 102 leads to chambers 103 and 104 respectively in which closure members 105 and 106 respectively close orifices 107 and 108 in washers 99 and 100 and also close washers 99 and 100 onto seatings 97 and 98. Closure members 105 and 106 are held onto valve washers 99 and 100 to close off outlets 93 and 94 by means of floats 109

and 110 carrying magnets 111 and 112 acting on magnets 113 and 114 of members 105 and 106. Floats 109 and 110 are preferably coupled as one float as shown and magnets 111 and 112 are conveniently a single magnet.

The float(s) 109 and 110 are held upwards by liquid from inlet 95 choked by choke valve 115 accumulating in chamber 116. Chamber 116 can if necessary have a siphon 117 to empty it or else the valve 115 may be opened by the chamber outlet 96 being connected to a bath overflow.

Valve 115 can alternatively have a manual control.

Valve 90 ensures that when the bath or basin overflows water to the taps from outlets 93 and 94 is cut off.

C L A I M S

1. A liquid level control valve comprising a liquid inlet (14,74) and a liquid outlet (16,76), a valve seating (30,73) and a valve closure member (34,68) cooperating with the seating to control a flow of liquid between the inlet and outlet, the valve closure member including a first magnetic element (36,66), and a float (44,62) connected to a second magnetic element (48,64), the magnetic elements cooperating so that as the liquid level increased the second magnetic element draws the closure member from the seating.

2. A control valve as claimed in claim 1 wherein the valve closure member is arranged to be drawn away from the seating until the float reaches a predetermined level where the buoyancy of the float overcomes the magnetic attraction between the magnetic elements enabling the closure member to return to close the valve.

3. A control valve as claimed in claims 1 or 2 wherein the first magnetic element is made of a soft iron and the second magnetic element is a permanent magnet.

4. A control valve as claimed in any one of claims 1 to 3 wherein the closure member is resiliently biased (42) downwards the closed position.

5. A control valve as claimed in any one of claims 1 to 4 wherein the closure member has a resilient termination (38,82) facing the calve seating.

6. A control valve as claimed in any one of claims 1 to

wherein the closure member is guided within a cylindrical member (40,67) the outside of which guides the float carrying the second magnetic element.

7. A control valve as claims in claim 6 wherein the cylindrical member is provided with a first stop (46) at its end remote the valve seating and a second and adjustable stop (47,84) at its end nearest the valve seating, the float and second magnetic member being movable between the stops.

8. A control valve as claimed in any one of claims 1 to 7 wherein a resilient (26,70) having a hole therein is interposed between the closure member and valve seating, the closure member closing the hole in the washer when in the closed position.

9. A control valve as claimed in any one of claims 1 to 8 wherein the float (109,110) is mounted within a chamber (116) having a further inlet (95) and a preferably choked further outlet (96) so that liquid entering the further inlet causes at least one said float (109,110) to close at least one said fluid inlet (91,92).

10. A control valve as claimed in claim 10 wherein a pair of floats (109,110) are mounted with the chamber (116) to close a pair of fluid inlets.

11. A control valve as claimed in claim 10 wherein a single float (109,110) is mounted within the chamber (116) to close a pair of fluid inlets (91,92).

12. A liquid level control valve substantially as described with reference to Figures 1 and 2 of the accompanying drawings.

13. A liquid level control valve substantially as described with reference to Figure 3 of the accompanying drawings.

14. A liquid level control valve substantially as described with reference to Figure 4 of the accompanying drawings.

Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

Application number: 9111739.0

Relevant Technical fields

(i) UK Cl (Edition K) F2V (VS42) G3P (PEAX)

(ii) Int CL (Edition 5) F16K

Search Examiner: PAM HYETT

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASE: WPI

Date of Search: 14 JULY 1992

Documents considered relevant following a search in respect of claims 1 TO 12

Category (see over)	Identity of document and relevant passages		Relevant to claim(s)
X,Y	GB 2217049 A	(DEDALOS) see particularly page 2, lines 3-15 and page 2, line 54 - page 3, line 7	X: 1-6, 9 Y: 8
X	GB 2210680 A	(WHITFORD) see particularly page 18, line 21 - page 21, line 9	1-3, 9
Y	GB 2149148 A	(PEGLERS LTD)	8
Y	US 4632142	(SHAMES) see Figures 14, 17	8
X	US 4444217	(CUMMINGS) see particularly column 4, lines 4-43 and column 6, lines 1-39	1, 5, 6
Y	US 4399835	(HOLDERITH) see Figure 5	8
X	US 3527172	(KRUEGER) see Figures 7, 8	1-3, 6,

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the prese application.

&: Member of the same patent family, corresponding document.

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

Published 1992 at The Patent Office, Concept House, Cardiff Road, Newport, Gwent NP9 1RH. Further copies may be obtained from Sales Branch, Unit 6, Nine Mile Point, Cwmfelinfach, Cross Keys, Newport, NP1 7HZ. Printed by Multiplex techniques ltd, St Mary Cray, Kent.